The Relationship between Injury Severity and Depression among College Soccer Athletes

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Abstract

Sports injuries are common among collegiate soccer players. Previous studies show that collegiate athletes are at risk for suffering from various levels of clinical depression and are at higher risk for severe injuries. Yet, there has been limited research exploring the psychological and emotional effects of sports injuries in a specific population, such as collegiate soccer players. The purpose of this study was to explore if increased injury severity is related to self-reported depression by surveying collegiate soccer players about their most recent soccer related injuries. In order to investigate this relationship, a survey examining depression from one's last soccer related injury was created. An injury severity scale was later created and used to categorize the collected data and allowed for further investigation into the relationship between injury severity and depression. Injuries were classified from 1 (least severe) to 3 (most severe). A two-way ANOVA was performed to examine the differences in depression scores by injury severity, gender and age. Scores for depression significantly increased with each injury severity category regardless of age or gender. Specifically, the average score for depression among athletes with an injury severity of 1 was 4.33 ± 4.52. The average score for depression among athletes with an injury severity of 2 was 10.46 ± 7.43, and the average score for depression among athletes with an injury severity of 3 was 15.04 ± 14.14. College soccer is a competitive, contact-driven sport with a high risk of injury. This research indicates that as injury severity increases in collegiate soccer players, there is also a trend of increasing depression regardless of gender or age. These results highlight the need for a greater focus on the negative mental and emotional outcomes following injuries among college athletes, especially severe injuries like concussions or ACL ruptures. A study pairing depression in collegiate athletics with a mental health intervention would provide additional research into this new area of study.

1. Introduction

The National Collegiate Athletics Association (NCAA) oversees approximately 400,000 student athletes[1,2]. Within this pool of student athletes, acute and overuse sports related injuries are common and come with additional psychological hardships, such as symptoms of anxiety and depression[3,4]. For example, the *American Journal of Sports Medicine* published an epidemiological study of high school and collegiate athletes regarding overuse injuries[3]. This study examined data from the NCAA's Injury Surveillance System (ISS) and the High School Reporting Information Outline (RIO) and discovered that collegiate sports had a 3.3 times higher rate of overuse injuries than high school sports[3]. Similarly, a study conducted by Yang and colleagues (2012) examined the epidemiology of acute and overuse injuries among 573 NCAA collegiate athletes[4]. Within this study they found that out of the 1,317 injuries reported, 70.7% were acute injuries and 29.3% were overuse. Additionally, the incidence of injury prevalence among NCAA college athletes according to the ISS has increased. According to the ISS data for female soccer players, there was an injury rate of 5.2 per 1,000 exposures from 1988-1989 through 2002-2003[5]. Whereas, in the 2004-2005 through 2008-2009 NCAA Sports Injury Fact Sheets, the injury rate for female college soccer players was 7.3 per 1,000 exposures[6].

According to the ISS data for male soccer players from 1988-1989 through 2002-2003, the injury rate was 4.3 injuries per 1,000 exposures[7]. Whereas, according to 2004-2005 through 2008-2009 NCAA Sports Injury Fact Sheets, the injury rate for male college soccer players was 7.7 per 1,000 exposures[6]. The increase in injury prevalence, in collegiate sports and college soccer specifically, is important to note because injuries are key components of exacerbating stress in a student athlete's daily life. This increased stress can lead to negative mental health outcomes, such as depression and depressive symptomology.

Depression is defined by the American Psychological Association as a mental disorder that causes negative emotional and physical disruptions to one's everyday life, such as increased fatigue, difficulty concentrating and/or feelings of sadness[8]. According to the *Journal of Sports Medicines* published review on Sports Psychiatry, an athlete could be predisposed to depression, have depression or have depression related to athletics[9]. Additionally, 1 in 4-5 young adults ages 18-24 have a mental health disorder and are 2 times more likely to have a mental health disorder appear during this time frame than in the older adult population[10]. Various forms of depression or depressive symptomology in collegiate athletics could be caused by injuries, overtraining, outside stress, or drug and alcohol abuse[11]. These extra stressors along with the stress of being a college student may contribute to the increased risk of depression that these athletes face[1,11,12].

Various sources of literature provide evidence that elite athletics may not be a contributing factor to mental illness and state that they provide protective factors of one's mental health, such as self-confidence and efficacy[2,9]. For example, in a study published by the *Journal of Clinical Sports Psychology*, a sample of 66 baseball players and 55 non-athletes from several colleges were given the Coping Inventory for Stressful Situations: Situation Specific Coaching (CISS:SSC) and the Center For Epidemiological Studies Depression Scale (CES-D) to examine coping strategies and stress[13]. In this study, fewer athletes (15.6%) met the criteria for depression than non-athletes (29.4%), which indicated lower levels of depression in the student-athlete population surveyed[13]. However, 15.6% of a group of 66 indicates that about 10 of these athletes met the guidelines for depression and still may require some intervention. Additionally, non-athletes are in a less controlled setting than athletes. Therefore, if athletics were as protective as studies indicate, depression rates would not be as high as 15.6%. Wolanin and colleagues (2016) conducted a three-year study on 435 NCAA Division 1 student athletes, where each spring, they completed the CES-D self-survey[2]. From these data they discovered that 6.3% of the athletes they studied had moderate-severe levels of depression, 23.7% had clinically relevant depression, and females had a 1.8 times higher risk of depression than males (p=.0006)[2]. These authors also examined individual rates of depression among sports and found that among the college soccer players surveyed, 23.1% had clinically relevant depression, and 5.8% had moderate-to-severe depression[2]. When examining the difference between male and female soccer players, these researchers discovered 31% of females had clinically relevant depression as compared to 13.0 % of males, and 10.3% of females had moderate-to-severe levels of depression as compared to none of the male athletes[2]. Another study conducted by Weigand, Cohen & Merenstein (2013) examined depression between current college athletes and graduated college athletes using the Wakefield Depression Scale[14]. In this study, 16.8% of current college athletes suffered from depression, as compared to 8.03% of graduated college athletes (P=.03)[14].

According to the National Association for Athletic Trainers, barriers to treatment of mental illness for college athletes, such as fear of stigma and negative feelings regarding seeking help, have a significant negative impact on willingness to seek help[11]. Additionally, only 20% of college students with mental health issues report feeling able to seek out help at their respective school health and counseling centers with college athletes reporting seeking less help than non-athletes[11,15]. Further evidence of this is exemplified in a study conducted by Gulliver, Griffiths and Christensen (2012) , in which a group of 15 elite athletes ages 16-23 participated in focus groups that revealed that stigma, negative health experience and health illiteracy were all significant hurdles to seeking mental health care[16]. One potential cause of these depressive symptoms or the exacerbation of predisposition to depression is injury and injury recovery.

Depressive symptomology in athletes can be sparked by injury and the feat of recovery[11,17]. In fact, according to the *Journal of Athletic Training*, more severe injuries with a longer healing time can cause an increase in one's mental health distress, such as symptoms of depression[10]. In addition, long term pain associated with severe injuries and chronic overuse injuries are factors in depressive symptomology in elite athletes[9]. For example, in a study by Yang and colleagues (2007), 257 Division 1 student athletes were self-surveyed using the CES-D. Out of the 257 Division 1 athletes, 21% reported experiencing depression with an increased risk for athletes with self-reported pain, female athletes and freshman athletes[18]. However, the relationship between depressive symptomology and injury severity has scarcely been studied in this field, especially in regard to specific sports, such as soccer.

Few studies have examined the relationship between injury severity and mental health. One such study examined post injury depression among male and female college athletes and was conducted by Appaneal, Levine, Perna, and Roh (2009)[17]. These authors examined 164 student athletes at 1 week, 1 month, and 3 months post injury using a self-

report check list of the Profile of Mood States (POMS) pre-injury and the CES-D and the Hamilton Rating Scale for Depression (SIGH-D) post injury[17]. The results of this study indicated that time away from one's sport due to severe injury was indicative of higher CES-D scores, but this difference did not reach statistical significance[17]. The research in this area of study is broad in nature and specifically focuses on depression without examining injuries or injury severity. Few studies exist that have looked at specific sports such as baseball, to examine depression. Yet none have investigated soccer players and the relationship between depression and injury severity, despite their high prevalence of injury and risk for depression. Thus, the purpose of the current study was to examine the relationship between injury severity and depression in NCAA collegiate soccer players using a self-survey with the Beck Depression Inventory II and an injury severity scale created by the researchers.

2. Methods

2.1. Participants

Participants were recruited via emails and phone calls to collegiate coaches and athletic trainers. Twenty-two North Carolina University soccer teams were selected from a convenience sample. Athletes could participate if they were a current college soccer player between the ages of 18 and 25. Any participants not fitting these criteria-team membership and age range, were excluded from the study. Out of the original 22 teams contacted, only two men's teams and two women's team participated. To compensate for the lack of participation, an additional addendum to the study was made to contact a larger pool of subjects from along the East Coast and Tennessee. Nineteen participants were dropped due to incomplete surveys. Complete data were available for 54 total participants, 24 male and 30 female. Six were excluded from the analysis due to an incomplete survey or lack of an injury severity score (n=1). The two most prevalent injuries reported were knee injuries (n=8) and ankle injuries (n=13).

2.2. Procedures

A survey was created that asked what soccer related injury the players most recently had and contained the Beck Depression Inventory II (BDI-II). The study proposal, informed consent and survey were approved by the UNC-Asheville Institutional Review Board. Survey data were collected in person via pen and paper at each designated university. Coaches and trainers were allowed to be present, during the survey data collection. Participants were assured that their data would be kept anonymous and not shared with the coaches or athletic trainers.

2.3. Measures

The Beck Depression Inventory II (Beck, 1996), was used to measure depression[20]. This is a 21-question survey that asks a series of questions ranking 0-3 (least to most severe)[19,20]. An example question from this survey is: During your last injury rate your feelings of past failure. The answer choices being 0-I did not feel like a failure, 1-I had failed more than I should have, 2-As I looked back, I saw a lot of failures, 3-I felt like a total failure as a person. The Beck Depression Inventory II is a scale of magnitude, scored by adding up all the numbers to the questions answered and comparing them to the scale of depression. This scale is 0-13 indicating minimal depression, 14-19 indicating mild depression, 20-28 indicating moderate depression, and 29-63 indicating severe depression. Many studies have shown reliability of the Beck Depression Inventory II in clinical settings with adolescent, adult and geriatric outpatients[21,22,23,24]. In a recent study of high school and collegiate student athletes, the Beck Depression Inventory II was used to measure student athlete depression[25].This research was used to validate the use the BDI-II as a study measure. The final survey was created with questions from the BDI-II.

An injury severity scale was created to code each of the injuries reported on a scale from mild (1) to severe (3). This scale was adapted based on typical time needed to recover and typical difficulty of recovery. The scale was created to compare differing injury severity with depression. An injury severity score of 1 was considered a mild injury. This meant that the athlete could still play soccer with little pain or risk of further damage to their current injury. For example, a broken thumb or turf toe was rated with an injury severity score of 1. An injury severity score of 2 was given to reported moderate injuries. These were injuries that the athletes could potentially play with but would have been painful and cause them risk for further injury. For example, a sprained ankle or strained groin muscle was rated with an injury severity of 2. An injury severity score of 3 was given to serious injuries such as a concussion or torn

ACL. These injuries were those that take an athlete out of their sport for an extended period of time, involve surgery or are detrimental to the athlete's long-term health.

2.4. Statistical Analyses

Statistical Analysis was performed using 2-way ANOVA's to examine depression scores by injury severity. These tests were run while controlling for gender and age. A significance level of $p<.05$ was set.

3. Results

The percentage distribution for the data set was 25% for injury severity 1, 46% for injury severity 2 and 29% for injury severity 3. Increasing depression scores by injury severity was significant regardless of gender ($F(48,2) = 4.440$, $p=.018$) or age ($F(47,2)=5.237$, $p=.010$). Specifically, the mean score for depression among athletes with an injury severity of 1 was 4.33 ± 4.52 (Figure 1, Table 1). The mean score for depression among athletes with an injury severity of 2 was 10.46 ± 7.43 (Figure 1, Table 1, and the mean scores for depression among athletes with an injury severity of 3 was 15.04 ± 14.14 (Figure 1, Table 1).
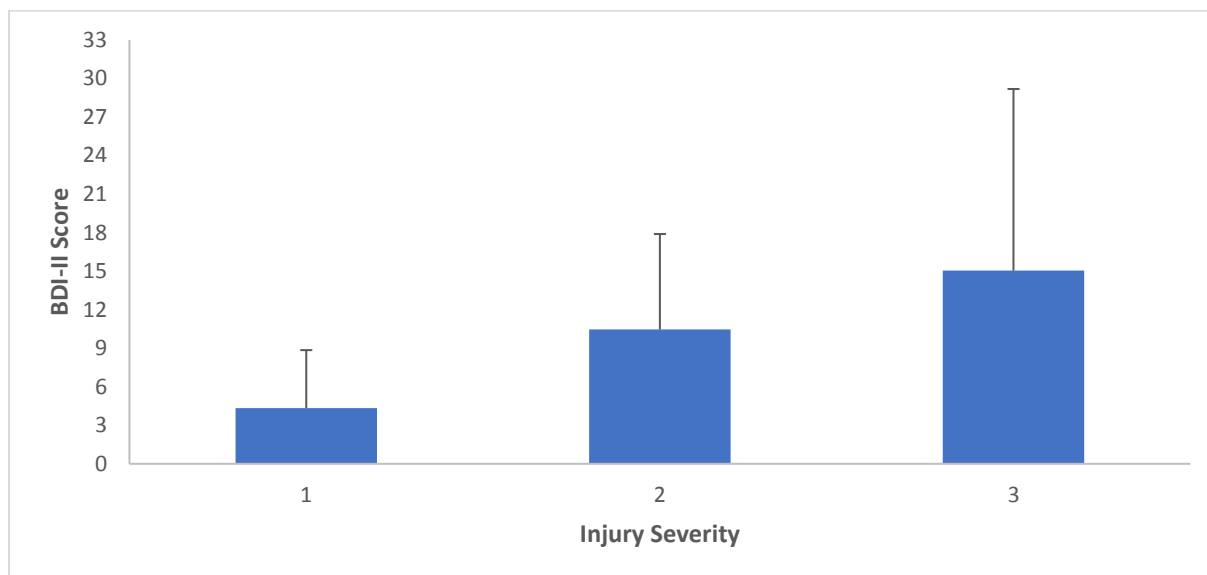

Figure 1. Mean Beck Depression II Score by Injury Severity

Table 1. Beck Depression Inventory II Mean Scores for Injury Severity

Injury Severity	Minimum	Maximum	Mean	Standard Deviation
1	0	17.0	4.33	+/- 4.52
2	0	25.0	10.46	+/- 7.43
3	0	50.0	15.04	+/- 14.14

4. Discussion

Beck Depression II scores show a statistically significant relationship as injury severity increases regardless of age or gender in collegiate soccer players. These results are similar to those found by Appaneal and colleagues (2009), where the more severe one's injury, the higher their depression scores[17]. The increase in depression scores regardless of age and of gender adds to results from previous studies, such as those published by the *Journal of Clinical Sports Psychology* and *British Journal of Sports Medicine*[2,13]. These studies only examined depression among collegiate athletes without injury severity as a factor. Additionally, these studies did not narrow down their athletic pool to a homogenous population, such as soccer players, which could also explain why the current findings differ from this research. Another potential explanation for the difference between the current findings and this study could be due to the difference in the injury severity definition for each study. The data collected in this study were from a small sample size, and one of the male participants had an extremely high depression score. These factors could have limited the current findings, and more research is needed to further investigate this area of study. However, the current findings do suggest that age and gender do not play a significant role in increases of self-report depression regarding injury severity.

 The mean values of each injury severity score show approximately a 5.36 Beck Depression II score increase as each injury severity score increases. This provides supporting evidence that as injury severity increases, self-report depression increases. For mild injury severity (1) the mean score was 4.33 ± 4.52, moderate injury severity (2) the mean score was 10.46 ± 7.43, and for severe injury severity (3), the mean score was 15.04 ± 14.14. Each score had a standard deviation of over 70% of the mean, indicating a variation of self-report Beck Depression inventory scores across injury severity. This could have been due to one male participant that reflected an extremely high Beck Depression II score of 50, a score indicative of severe clinical depression. Upon review, it was found that the individual correctly filled out this inventory and was appropriate to include in the study. However, though this individual seems to spread the standard deviation, this variation exemplifies the diversity among individual depressive reactions to the stress of a soccer related injury. For example, a soccer player with an injury severity of 1 may have a moderate to severe depression score, which could mean this individual is predisposed to depression or is having some difficulty outside of the athletic realm. Meanwhile, another individual may have an injury severity score of 3 and report minimal to no depression, which may be indicative of protective factors and resilience that individual holds.

 The individuality and variance of these scores indicate and provide evidence to focusing on the injured individual's mental health when treating injuries. One player is not going to have the same reaction or resilience as their teammates, which is why individualizing treatment is essential. This study brings evidence to the current research regarding injury severity and depression among college athletes. Future research should be focused on examining injury severity and depression with a pre and post comprehensive evaluation, similar to what was done by Appaneal and colleagues (2009) and introducing a mental health care intervention, such as having a mental health professional on the team healthcare staff[17]. Ideally, if this future study were to yield positive results, it could lead to advocacy for the presence of mental health professionals on the medical staff for the sports team. This professional could be involved in student-athlete rehabilitation, provide mental health care to the athlete and decrease the stigma surrounding mental health care in in athletics.

5. Conclusion

The aim of this study was to evaluate the relationship between depression and injury severity in college soccer players. The current results indicate that as injury severity increases, levels of self-report depression increase. This seems to be regardless of age or gender; however, a larger pool of participants would be needed to make this conclusion. The analysis of means conducted indicates that there is about a 5.36 increase in Beck Depression II scores as injury severity increases. These findings indicate that more research needs to be conducted in this area with possible future studies involving pre and post injury severity surveys with a mental health intervention in place.

 Limitations of this study include self-report measures, small participant pool with more women than men, no control group and difficulty in participant recruitment. These limitations could be remedied in future studies, through a longer time duration and participation incentives. Coaches, athletic trainers and athletes would be more apt to participate upon knowing the positive benefits of mental health care throughout injury rehabilitation. These benefits include improved mental performance on and off of the field allowing injured athletes to return to play at the top of their game. To the researcher's knowledge no other research has been done that is similar to this study.

6. Acknowledgements

7. References

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